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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
MALEK, LEILA	

ART UNIT	PAPER NUMBER
2611	

MAIL DATE	DELIVERY MODE
06/27/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/621,293	GARMANY ET AL.	
	Examiner	Art Unit	
	Leila Malek	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 April 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10 and 17-56* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *1-10,17-44 and 49-56* is/are allowed.

6)☒ Claim(s) *45 and 48* is/are rejected.

7)☒ Claim(s) *46 and 47* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *17 July 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments, see pages 20-22, 24, and 26, filed on 04/16/2007, with respect to claims 1-56 have been fully considered and are persuasive. The objections and rejections of the above claims have been withdrawn.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claim 45 is rejected under 35 U.S.C. 102(e) as being anticipated by Pham (US 2002/0191779).

As to claim 45, Pham discloses a method comprising: averaging a first stream of power spectra of an input signal to generate a second stream of averaged power spectra (see Fig. 13 blocks 158 and 160 and paragraphs 0151-0152); filtering a selected one of the averaged power spectra in the second stream to obtain a filtered power spectrum (see paragraph 0100 and Fig. 11, blocks 124 and 126); computing an inverse transform on the filtered power spectrum to obtain an autocorrelation signal (see paragraph 0194); analyzing peaks in the autocorrelation signal to determine a significant subset of the peaks (see Figs 1, 5 and paragraph 0134); computing echo

delay times and echo coefficients from the significant subset of the peaks (see paragraphs 0055-0060); computing a channel spectrum estimate (i.e. the channel impulse response) from the echo delay times and echo coefficients (see paragraphs 0044, 0059-0060); wherein the channel spectrum estimate is usable to compute an estimate of an original transmission to permit recovery of information from the input signal (see paragraphs 0041 and 042).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claim 48 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pham in view of Martinez (US 4,823,382).

As to claim 48, Pham discloses all the subject matters claimed, except that averaging comprises averaging with an IIR filter, such that the effect of past contribution to the average decays exponentially with time. Martinez, in the same field of endeavor, discloses an echo canceller comprising an averaging unit 60 (see Fig. 5), wherein the averaging unit is actually a single pole IIR filter (i.e. exponential weighted averaging), which provides an adequate estimate of the average power to the system (see col. 8, lines 56-59). It would have been obvious to one of ordinary skill in the art at the time of invention to modify Pham as suggested by Martinez to use an IIR filter to average the

power spectrum in order to minimize memory requirements, because only the current sample plus one decaying average need be maintained.

Allowable Subject Matter

4. Claims 46 and 47 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

5. Claims 1-10, 17-37 and 49-51 are allowed. The following is an examiner's statement of reasons for allowance: a comprehensive search of prior art of record failed to disclose, either alone or in combination, a method/apparatus comprising: identifying the one or more major echoes present in the input signal; identifying the one or more minor echoes from a filtered autocorrelation function of the input signal in response to a determination that there is only one major echo; identifying the one or more minor echoes from a filtered power spectrum of the input signal in response to a determination that there is more than one major echo; computing a channel spectrum estimate from the one or more major echoes and the one or more minor echoes; wherein the channel spectrum estimate is usable to remove at least a portion of the one or more major echoes and the one or more minor echoes from the input signal.

6. Claims 38-44 are allowed. The following is an examiner's statement of reasons for allowance: a comprehensive search of prior art of record failed to disclose, either alone or in combination, a method comprising: receiving a first stream of blocks of samples of an input signal; (b) computing a transform of each block of samples to generate a second stream of signal spectra; (c) performing a frequency-domain

autocorrelation operation on each signal spectrum of the second stream to obtain a third stream of power spectra; (d) filtering the third stream of power spectra to obtain a filtered stream of power spectra; (e) computing an analytic signal by performing an inverse transform of a current one of the filtered stream of power spectra over non-negative frequencies; (f) estimating complex coefficients for a set of echoes from an analysis of pulses in selected intervals of the analytic signal, given a current estimate of delay times for the set of echoes; (g) generating a revised channel spectrum estimate from phase changes of the estimated complex coefficients and the current estimate of the delay times; (h) repeating (e), (f), and (g); (i) updating the set of echoes including delay times in response to an update condition.

7. Claims 52 and 53 are allowed. The following is an examiner's statement of reasons for allowance: a comprehensive search of prior art of record failed to disclose, either alone or in combination, a method comprising: receiving the input signal; determining that there is more than one major echo in the input signal; (a) computing a spectrum F corresponding to a sum of the major echoes; (b) computing a filtered power spectrum of the spectrum F; (c) subtracting the filtered power spectrum from a filtered power spectrum of the input signal to obtain a difference spectrum; (d) performing a stabilized division of the difference spectrum by a conjugate of the spectrum F to obtain an intermediate spectrum; (e) computing an inverse transform of the intermediate spectrum to obtain a time-domain signal; (f) estimating one or more of the minor echoes from the time-domain signal to obtain echo parameters for the one or more minor echoes; (g) storing the echo parameters for the one or more minor echoes in a

memory, wherein the echo parameters are usable to remove at least of portion of the one or more echoes from the input signal; (h) adding the one or more minor echoes to the spectrum F.

8. Claims 54-56 are allowed. The following is an examiner's statement of reasons for allowance: a comprehensive search of prior art of record failed to disclose, either alone or in combination, a method comprising: receiving the input signal; determining that there is only one major echo in the input signal; computing an amplitude envelope of a filtered autocorrelation function of the input signal; generating a first list of peaks in the amplitude envelope, excluding a peak at zero delay, that exceed an amplitude threshold; determining the number of peaks in the first list; performing a first procedure in response to a determination that the number of peaks is greater than or equal to three, wherein the first procedure includes: (a) accessing two peaks of largest amplitude from the first list; (b) removing the accessed peaks from the first list, and adding delay times and complex amplitudes corresponding to the accessed peaks to a second list; (c) computing a table T of differences between pairs of delay times in the second list, and computing a table S of sums of pairs of delay times of the accepted peaks; (d) deleting from the first list any peaks whose delay times correspond to at least one of the generated sums in table S or at least one of the differences in table T; (e) accessing a next peak of largest amplitude from the first list, and repeating (b) through (d), in response to a determination that the first list is nonempty.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leila Malek whose telephone number is 571-272-8731. The examiner can normally be reached on 9AM-5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad Ghayour can be reached on 571-272-3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Leila Malek
Examiner
Art Unit 2611

L.M.

MOHAMMED GHAYOUR
SUPERVISORY PATENT EXAMINER